

Chapter 6 / **Example 25**

Solving a trigonometric equation

Use your GDC to solve $\sin 3x^\circ + \cos 2x^\circ = 1$ for $0^\circ \leq x \leq 180^\circ$.

Press **[mode]**.

Use the **[◀]** **[▶]** **[↶]** **[↷]** keys to place the cursor on DEGREE in the Mode menu, and then press **[enter]** to highlight it.

Press **[2nd]** **[quit]** to return to the home screen.

```
MATHPRINT CLASSIC
NORMAL SCI ENG
FLOAT 0 1 2 3 4 5 6 7 8 9
RADIAN DEGREE
FUNCTION PARAMETRIC POLAR SEQ
THICK DOT-THICK THIN DOT-THIN
SEQUENTIAL SIMUL
REAL a+bi re^(θi)
FULL HORIZONTAL GRAPH-TABLE
FRACTIONTYPE: D F Un/d
ANSWERS: AUTO DEC FRAC-APPROX
GO TO 2ND FORMAT GRAPH: NO YES
STAT DIAGNOSTICS: OFF ON
STAT WIZARDS: ON OFF
SET CLOCK 09/07/18 8:28PM
```

Press **[f1]** **[y=]** to display the equation entry screen.

Type $\sin(3x) + \cos(2x)$ and press **[enter]** to enter the first equation as Y_1 .

Type 1 and press **[enter]** to enter the second equation as Y_2 .

```
Plot1 Plot2 Plot3
Y1= sin(3X)+cos(2X)
Y2= 1
Y3=
Y4=
Y5=
Y6=
Y7=
Y8=
Y9=
```

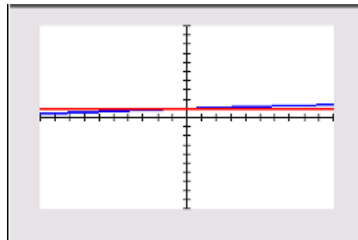
Press **[f5]** **[graph]** to display the graph screen

The GDC now displays the curve and the straight-line:

$$Y_1 = \sin 3x + \cos 2x$$

$$Y_2 = 1$$

The default axes are $-10 \leq x \leq 10$ and $-10 \leq y \leq 10$.



Press **[f2]** **[window]** and set the axes so that $0 \leq x \leq 180$ with a scale of 30 and $-3 \leq y \leq 3$ with a scale of 1.

You can leave the last three items as they are.

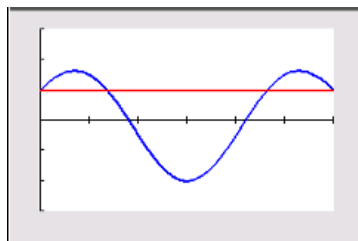
```
WINDOW
Xmin=0
Xmax=180
Xscl=30
Ymin=-3
Ymax=3
Yscl=1
Xres=1
ΔX=.68181818181818
TraceStep=1.3636363636364
```

Press **[f5]** **[graph]**. The GDC now displays both graphs:

$$Y_1 = \sin 3x + \cos 2x$$

$$Y_2 = 1$$

with suitable axes.



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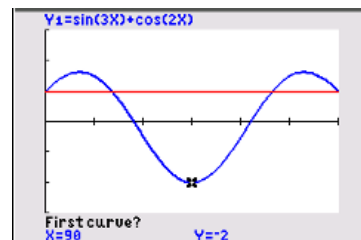
Solving a trigonometric equation

Press **2nd** **[f4]** **[calc]** 5:intersect.

To find the intersection you need to choose the two lines that intersect.

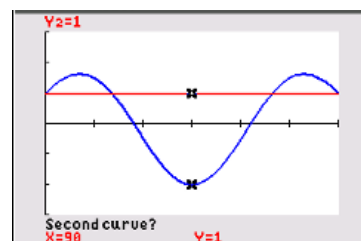
The GDC shows a cross on the curve and 'First curve?'.

Press **enter**.



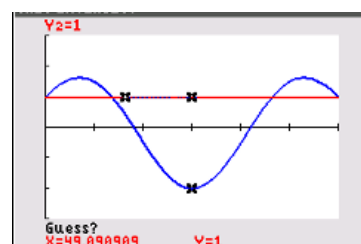
The GDC shows a cross on the line and 'Second curve?'.

Press **enter**.

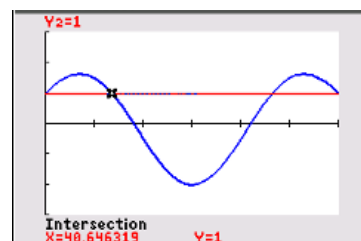


The GDC requires an initial guess for the position of the intersection. Choose a point close to the first intersection by moving the cursor with the **◀** **▶** keys.

Press **enter**.



The GDC displays an intersection at (40.6,1).



Repeat for the other intersections.

The GDC shows an intersection at (139.4,1) and also at (0,1) and (180,1).

The solutions to the equation are 0° , 40.6° , 139.4° and 180° .

